ANTIBODIES AGAINST KIDNEY ASSOCIATED ANTIGEN 1 AND ANTIGEN BINDING FRAGMENTS THEREOF

PRIORITY CLAIM

[0001] This patent application is a continuation of U.S. application Ser. No. 15/811,545 filed on Nov. 13, 2017, which is a continuation of U.S. application Ser. No. 15/137,368 filed on Apr. 25, 2016, now U.S. Pat. No. 9,828,426, which is a continuation of U.S. Ser. No. 14/558,186 filed on Dec. 2, 2014, now U.S. Pat. No. 9,393,302, which is a continuation of U.S. Ser. No. 14/036,204 filed on Dec. 10, 2013, now U.S. Pat. No. 8,937,163, which is a national stage filing under 35 U.S.C. § 371 of international application No. PCT/CA2012/000296 filed on Mar. 28, 2012 which claimed priority to U.S. provisional application No. 61/470,063 filed on Mar. 31, 2011 and U.S. provisional application No. 61/533,346 filed on Sep. 12, 2011. The entire contents of each of these priority applications are incorporated herein by reference.

SEQUENCE LISTING

[0002] In accordance with 37 C.F.R. § 1.52 (e)(5), a Sequence Listing in the form of a text file (entitled "11504-231C2_SeqListing_ST25.txt", created on Jul. 17, 2020 of 89,703 bytes) is incorporated herein by reference in its entirety.

FIELD OF THE INVENTION

[0003] The present invention relates to specific antibodies or antigen binding fragments that specifically bind to kidney associated antigen 1 (KAAG1) and their use for the treatment, detection and diagnosis of cancer. Delivery of a therapeutic agent to cells with these antibodies or antigen binding fragments is particularly contemplated.

BACKGROUND OF THE INVENTION

[0004] Among gynecologic malignancies, ovarian cancer accounts for the highest tumor-related mortality in women in the United States (Jemal et al., 2005). It is the fourth leading cause of cancer-related death in women in the U.S. (Menon et al., 2005). The American Cancer Society estimated a total of 22,220 new cases in 2005 and attributed 16,210 deaths to the disease (Bonome et al., 2005). For the past 30 years, the statistics have remained largely the same—the majority of women who develop ovarian cancer will die of this disease (Chambers and Vanderhyden, 2006). The disease carries a 1:70 lifetime risk and a mortality rate of >60% (Chambers and Vanderhyden, 2006). The high mortality rate is due to the difficulties with the early detection of ovarian cancer when the malignancy has already spread beyond the ovary. Indeed, >80% of patients are diagnosed with advanced staged disease (stage III or IV) (Bonome et al., 2005). These patients have a poor prognosis that is reflected in <45% 5-year survival rate, although 80% to 90% will initially respond to chemotherapy (Berek et al., 2000). This increased success compared to 20% 5-year survival rate years earlier is, at least in part, due to the ability to optimally debulk tumor tissue when it is confined to the ovaries, which is a significant prognostic factor for ovarian cancer (Bristow R. E., 2000; Brown et al., 2004). In patients who are diagnosed with early disease (stage I), the 5-yr survival ranges from >90 (Chambers and Vanderhyden, 2006).

[0005] Ovarian cancer comprises a heterogeneous group of tumors that are derived from the surface epithelium of the ovary or from surface inclusions. They are classified into serous, mucinous, endometrioid, clear cell, and Brenner (transitional) types corresponding to the different types of epithelia in the organs of the female reproductive tract (Shih and Kurman, 2005). Of these, serous tumors account for ~60% of the ovarian cancer cases diagnosed. Each histologic subcategory is further divided into three groups: benign, intermediate (borderline tumor or low malignancy potential (LMP)), and malignant, reflecting their clinical behavior (Seidman et al., 2002). LMP represents 10% to 15% of tumors diagnosed as serous and is a conundrum as they display atypical nuclear structure and metastatic behavior, yet they are considerably less aggressive than high-grade serous tumors. The 5-year survival for patients with LMP tumors is 95% in contrast to a<45% survival for advanced high-grade disease over the same period (Berek et al., 2000).

[0006] Presently, the diagnosis of ovarian cancer is accomplished, in part, through routine analysis of the medical history of patients and by performing physical, ultrasound and x-ray examinations, and hematological screening. Two alternative strategies have been reported for early hematological detection of serum biomarkers. One approach is analysis of serum samples by mass spectrometry to find proteins or protein fragments of unknown identity that detects the presence or absence of cancer (Mor et al., 2005; Kozak et al., 2003). However, this strategy is expensive and not broadly available. Alternatively, the presence or absence of known proteins/peptides in the serum is being detected using antibody microarrays, ELISA, or other similar approaches. Serum testing for a protein biomarker called CA-125 (cancer antigen-125) has long been widely performed as a marker for ovarian cancer. However, although ovarian cancer cells may produce an excess of these protein molecules, there are some other cancers, including cancer of the fallopian tube or endometrial cancer (cancer of the lining of the uterus), 60% of people with pancreatic cancer, and 20%-25% of people with other malignancies with elevated levels of CA-125. The CA-125 test only returns a true positive result for about 50% of Stage I ovarian cancer patients and has a 80% chance of returning true positive results from stage II, III, and IV ovarian cancer patients. The other 20% of ovarian cancer patients do not show any increase in CA-125 concentrations. In addition, an elevated CA-125 test may indicate other benign activity not associated with cancer, such as menstruation, pregnancy, or endometriosis. Consequently, this test has very limited clinical application for the detection of early stage disease when it is still treatable, exhibiting a positive predictive value (PPV) of <10%. Even with the addition of ultrasound screening to CA-125, the PPV only improves to around 20% (Kozak et al., 2003). Thus, this test is not an effective screening test.

[0007] Despite improved knowledge of the etiology of the disease, aggressive cytoreductive surgery, and modern combination chemotherapy, there has been only little change in mortality. Poor outcomes have been attributed to (1) lack of adequate screening tests for early disease detection in combination with only subtle presentation of symptoms at this stage—diagnosis is frequently being made only after progression to later stages, at which point the peritoneal dissemination of the cancer limits effective treatment and (2) the frequent development of resistance to standard chemotherapeutic strategies limiting improvement in the 5-year